

- (21) Application No. 42622/71 (22) Filed 13 Sept. 1971  
 (31) Convention Application Nos. 73601 (32) Filed 18 Sept. 1970  
 165759 15 July 1971 in  
 (33) United States of America (US)  
 (44) Complete Specification published 11 April 1973  
 (51) International Classification A23L 3/34  
 (52) Index at acceptance A2D 2L 2M 3A1  
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## (54) STABILIZATION OF SOFT DRINKS

(71) We, MERCK & Co. INC., a corporation duly organised and existing under the laws of the State of New Jersey, United States of America, of Rahway, New Jersey, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the stabilization of colors in traditional soft drinks in cans and bottles. It also involves the stabilization of Vitamin C in such beverages.

By traditional soft drinks is meant the fruit (and sometimes vegetable) flavored beverages such as cola, orange, grape and the like carbonated or still drinks. If they are entirely synthetic they are appropriately dyed to resemble the color of a natural drink, or if they are a punch they are colored to give them an attractive appearance. Even if they contain a substantial amount of natural juice as in the case of many orange and grape drinks, coloring agents are often added to augment the color of the beverage.

These traditional soft drinks often contain Vitamin C because of its nutritional value and to thereby increase the sales appeal of the product. However, the combination of Vitamin C in drinks having a conventional dye therein has been found to be impracticable because either the Vitamin C or the color agent or both of them have deteriorated during storage. Vitamin C is a reducing agent. It can act on food dyes to change their color or decolorize them. A particularly susceptible group of foods are those containing compounds having azo linkages, e.g. FD and C Red No. 1, 2, or 4, or Orange No. 1 or 2.

Presumably, the azo linkage,  
 $R-N=N-R', -N=N-$ ,  
 is reduced to

$RNH_2 + R'NH_2$ .

The present invention is based on the discovery that the yellow food dye, tartrazine, exerts a protective effect on food colors in the presence of Vitamin C. It has also been

found that tartrazine exerts a stabilizing effect on Vitamin C in beverages containing no added color. The present invention provides a soft drink containing Vitamin C and/or a food color and an amount of tartrazine effective to stabilize the said Vitamin and/or color.

Tartrazine is also known as FD and C yellow No. 5 and it is described on page 1015 of the eighth edition of the Merck Index.

The amount of tartrazine that may be added to the beverage is not critical and may vary from 0.05 mg. to 0.20 mg. per 100 ml. of beverage. The term beverage referred to relates to those which contain Vitamin C with or without added coloring agents.

*Example 1*

A conventional grape drink concentrate, containing flavor, sucrose, acidulant and color was blended with water at 4 oz. concentrate to 28 oz. water to yield finished beverage.

To 12 fl. oz. of the beverage was added 120 mg. ascorbic acid and 33.16 mg. ferrous sulfate heptahydrate to yield System I.

System II was prepared exactly as System I, but 0.42 mg. tartrazine was added per bottle.

The two bottles were stored at 38°C for two months. Optical density of the beverages at 600  $\mu$  at this time were:

System I	0.300
System II	0.365

Whereas System I showed distinct fading, this same system with the tartrazine, i.e. System II was protected.

*Example 2*

One thousand U.S. gallons of a conventional punch colored with FD and C red No. 2 was canned on a commercial line to yield Product I. The process included HTST (high temperature short time) pasteurization and used quart cans.

To 1,000 U.S. gallons of the same punch

drink was added 1280 gm. ascorbic acid. This was canned as above to yield product II.

To 1,000 U.S. gallons of the same punch drink was added 1280 gm. ascorbic acid and 4.46 gm. tartrazine to yield product III.

The cans were stored at 38°C for the times shown below, and analysed for Vitamin C and color. Color was determined by diluting the beverage 1:1 with isopropanol, centrifuging and reading at 545m $\mu$ .

	I	II	III
3 Weeks			
Ascorbic Acid (mg./ml.)	0	0.284	0.310
Ascorbic + dehydroascorbic (mg./ml.)	0.024	0.310	0.324
Color	0.505	0.442	0.462
5 Weeks			
Ascorbic Acid (mg./ml.)	0	0.265	0.308
Ascorbic + dehydroascorbic (mg./ml.)	0.035	0.285	0.300
Color	0.482	0.420	0.470

#### Example 3

Tartrazine is added to a conventional orange drink which owes its flavor in part to orange juice. Its Vitamin C content as well as its yellow color will remain stable.

#### Example 6

FD and C Red No. 2 97.5 gms.  
Tartrazine 2.5 gm.  
This premix would be added to 2,000 liters of a flavored beverage to give it a cherry color.

#### Example 4

Instead of the red dye in Example 2 or in addition thereto, another food color is present.

#### Example 7

FD and C Red No. 2 93.0 gms.  
FD and C Blue No. 1 4.5 gms.  
Tartrazine 2.5 gms.  
This premix would be added to 1,820 liters of a flavored beverage to give it a grape color.

#### Example 5

Beverages are prepared and canned as in Example 2, however without the FD and C Red No. 2. Vitamin C is found to have the enhanced stability demonstrated in Example 2, by virtue of the addition of the tartrazine.

This invention also includes a dry preparation in the form of a premix which is to be added to flavored water to make a beverage. This premix will contain a dye and tartrazine so that when the premix is added to the water the dye will be stabilized by the tartrazine. For instance, if the dye is FD and C Red. No. 2 the tartrazine will stabilize it against deterioration and fading or color change in the beverage. This stabilization of a color dye is achieved if the tartrazine amounts to 1.25 to 5.00% of the total weight of the dyes, 2.5% being preferred.

The premix may additionally contain Vitamin C, as the tartrazine will then stabilize this vitamin as well as the dye; that is, the tartrazine will stabilize the Vitamin C and thereby reduce or overcome its attack on the dye. Additionally the premix may contain only Vitamin C and tartrazine, i.e. no dye will be present, so that in the beverage to which this premix is added the Vitamin C will be stabilized by the tartrazine. If no dye is present to be stabilized, the tartrazine needs to amount to only about 0.175 to 0.7% of the total weight of the Vitamin C and tartrazine to obtain the desired stabilization of the Vitamin C. A greater amount of tartrazine may add its yellow color to the beverage.

#### Example 8

FD and C Red No. 2 2.0 gms.  
FD and C Yellow No. 6 95.5 gms.  
Tartrazine 2.5 gms.  
This premix would be added to 1,850 liters of a flavored beverage to give it an orange color.

#### Example 9

Other color dyes, singly or in combination to produce the desired color on addition to the beverage may be made up to include tartrazine in the above relative range, i.e. 1.25 to 5.00% of the total dye weight.

#### Example 10

Ascorbic Acid 99.65 gms.  
Tartrazine 0.35 gms.  
The premix would be added to 177 liters of a flavored beverage.

#### Example 11

Ascorbic acid 99.825 to 99.30 gms.  
Tartrazine 0.70 to 0.175 gms.  
The selected, proportioned premix would be used in Example 10.

#### Example 12

To any one of the Examples 6 to 9, 100 grams of ascorbic acid may be added to the premix and twice as much of the premix would be added to the flavored beverage.

## WHAT WE CLAIM IS:—

1. A soft drink containing Vitamin C and an effective amount of tartrazine sufficient to stabilize said Vitamin C.
- 5 2. A soft drink containing a food color and an effective amount of tartrazine sufficient to stabilize the food color.
3. A soft drink containing a food color and Vitamin C and an effective amount of tartrazine sufficient to stabilize the Vitamin C and exert a protective effect on said food color.
- 10 4. A method of stabilizing a soft drink containing Vitamin C which comprises adding to said soft drink a stabilizing amount of tartrazine.
- 15 5. A method of protecting food color and stabilizing Vitamin C in a soft drink which comprises the addition of an effective amount of tartrazine to said soft drink.
- 20 6. A premix for addition to flavored water to constitute a beverage consisting of 0.175 to 0.70 parts by weight of tartrazine and 99.30 to 99.825 parts by weight of Vitamin C.
- 25 7. A premix for addition to flavored water to constitute a beverage consisting of 1.25 to 5.00 parts by weight of tartrazine and 95.0 to 98.75 parts by weight of the dye.
8. A premix for addition to flavored water to constitute a beverage, consisting of tartrazine as a stabilizing agent together with Vitamin C and a beverage dye, the amount of beverage dye being from 95.0 to 98.75 parts by weight for every 1.25 to 5.00 parts by weight of tartrazine.
9. A premix as claimed in Claim 6, substantially as hereinbefore described in Example 10 or 11.
10. A premix as claimed in Claim 7, substantially as hereinbefore described in any one of Examples 6-9.
11. A premix as claimed in Claim 8, substantially as hereinbefore described in Example 12.
12. A soft drink as claimed in Claim 3, substantially as hereinbefore described in any one of Examples 1-4.
13. A soft drink as claimed in Claim 1, substantially as hereinbefore described in Example 5.

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(10023)

Printed in Scotland by Her Majesty's Stationery Office  
at HMSO Press, Edinburgh, 1973.

Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,  
from which copies may be obtained.

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